WHAT WE CLAIM IS:

CLAIM 1. A polishing pad for use in chemical mechanical polishing of substrates, said polishing pad having a polishing surface, comprising:

a fibrous matrix consisting of porous fibers;

a binder for binding said fibrous matrix, said binder consisting of thermoset resin material;

said fibrous matrix and said binder forming a porous structure by which polishing slurry and polishing debris during chemical mechanical polishing of substrates are stored for subsequent rinsing away, and for enhanced flow-distribution of the polishing slurry.

CLAIM 2. The polishing pad according to claim 1, said polishing pad being used in chemical mechanical polishing of substrates, wherein said fibrous matrix consists of cellulose fibers, and said thermoset resin material consists of phenolic resin for binding said cellulose fibers.

CLAIM 3. The polishing pad according to claim 1, said polishing pad being used in chemical mechanical polishing of substrates, wherein said fibrous matrix consists of at least one of: cellulose fibers and "ARAMID", and said thermoset resin material consists of at least one of the following: Phenolic resin, epoxy, silicone, for binding said fibers.

CLAIM 4. The polishing pad for use in chemical mechanical polishing of substrates according to claim 2, wherein said cellulose fibrous matrix is derived from of at least one of: Cotton linters and wood pulp.

CLAIM 5. The polishing pad according to claim 1 , claim 2, or claim 3, wherein said polishing surface by which a substrate may be planarized using chemical mechanical polishing comprises a ground surface in order that said fibrous matrix thereat is of open construction so that polishing slurry may be readily absorbed and optimally distributed during chemical mechanical polishing of substrates.

CLAIM 6. The polishing pad for use in chemical mechanical polishing of substrates according to claim 3, wherein said fibers of said fibrous matrix are fortified with latex.

CLAIM 7. The polishing pad according to claim 1, wherein said fibers of said fibrous matrix are fortified with latex.

CLAIM 8. The polishing pad for use in chemical mechanical polishing of substrates according to claim 2, wherein said fibrous matrix consists of cellulose fibers fortified with latex.

CLAIM 9. The polishing pad for use in chemical mechanical polishing of substrates according to claim 5, wherein said ground polishing surface consists of surface asperities by which said optimal distribution of polishing slurry during chemical mechanical polishing of substrates is achieved.

CLAIM 10. The polishing pad for use in chemical mechanical polishing of substrates according to claim 9, wherein said surface asperities, by which said optimal distribution of polishing slurry during chemical mechanical polishing of substrates is achieved, are each preferably at least 10 microns in depth, width and/or length.

CLAIM 11. The polishing pad for use in chemical mechanical polishing of substrates according to claim 1, claim 3 or claim 4, wherein said polishing surface further comprises groove means for optimal distribution of polishing slurry during chemical mechanical polishing of substrates.

CLAIM 12. The polishing pad for use in chemical mechanical polishing of substrates according to claim 11, wherein said groove means for optimal distribution of polishing slurry during chemical mechanical polishing of substrates comprises an arc-radial groove pattern.

CLAIM 13. The polishing pad for use in chemical mechanical polishing of substrates according to claim 1, wherein said fibrous matrix is of at least one of the following fibers: cellulose, "ARAMID", rayon, linen, carbon, graphite, polyamide, polymer, and lyocell.

CLAIM 14. The polishing pad for use in chemical mechanical polishing of substrates according to claim 13, wherein said fibrous matrix is comprised of fibers having cross-sectional diameters of between 10 and 50 microns, and a length in the range of between .4 and 1.3mm.

CLAIM 15. A method of chemical mechanical polishing, comprising:

(a) supplying a slurry to a polishing pad have a plurality of pores therein;

(b) bringing a substrate into contact with a polishing surface of the polishing pad;

(c) causing relative motion between the substrate and the polishing surface;

(d) after said step (c), cleaning the pad to remove slurry from the pores.

CLAIM 16. . A polishing pad for chemical mechanical polishing of a substrate, comprising:

a layer of polishing material having a mesh of fibers and a binder material holding the fibers in the mesh, the binder material coalesced among the fibers to leave pores in the interstices between the fibers of the mesh; and

a polishing surface to contact and polish a substrate, said fibers and binder material providing a polishing material with a brittle structure.

CLAIM 17. A chemical mechanical polishing apparatus, comprising:

a center head to hold a substrate;

a polishing pad comprised of a mesh of fibers and a binder material holding the fibers in the mesh, the binder material coalesced among the fibers to provide pores in the interstices between the fibers of the mesh, wherein the fibers and binder material provide the polishing pad with a brittle structure; and

a slurry supply to dispense a polishing slurry to the polishing pad.

CLAIM 18. A method of forming a fiber matrix to serve as a medium for subsequent resin impregnation, for use as a polishing pad for chemical mechanical polishing of substrates, comprising:

(a) dispersing fibers in water to form a slurry;

(b) forming a fiber matrix by a wet-laid process;

(c) said wet-laid process comprising draining water from the slurry by gravity and/or vacuum drainage;

(d) drying the wet fiber matrix of said step (c) for creating a relatively soft, compliant fiber mat from which a polishing pads for use in chemical mechanical polishing of substrates are formed.

CLAIM 19. The method according to claim 18, wherein said steps (b) through (d) are performed by at least one of the following: a handsheet mold, a fourdrinier machine, an incline wire machinery, roto-former machine, twin wire machine.

CLAIM 20. The method according to claim 18, wherein said steps (b) through (d) are performed by using a suction process.

CLAIM 21. The method according to claim 18, wherein said step (a) also comprises dispersing a latex binder, or equivalent thereof, in the water to form a slurry of fibers and binder.

CLAIM 22. The method according to claim 19, further comprising, before said step (d), applying a latex binder, or equivalent thereof, to the fiber surfaces.

CLAIM 23. A method of forming a polishing pad for use in chemical mechanical polishing of substrates, comprising:

(a) forming a fiber matrix;

(b) binding the fiber matrix with a binder material;

(c) curing the binder material with heat to form a fiber mat that is relatively soft and compliant.

(d) said step (b) comprising binding the fiber matrix with a thermoset resin.

CLAIM 24. The method according to claim 23, wherein said step (d) comprises using a binder from at least one of the following: phenolic, epoxy, silicone, and modified phenolics.ethod as in claim 13, wherein the resin impregnation process is done by soaking the fiber mate in a bath of liquid resin.

CLAIM 25. The method according to claim 23, wherein said step (d) comprises exposing the fiber matrix to curtains of liquid resin, or spraying liquid resin onto the fiber matrix.

CLAIM 26. The method according to claim 23, further comprising densifying the resin impregnated matrix.

CLAIM 27. The method according to claim 23, further comprising forming a grooved-surface pattern in the surface of the fiber mat.

CLAIM 28. The method according to claim 28, wherein said step of forming a grooved -surface pattern is performed after the thermoset resin is fully cured.

CLAIM 29. The method according to claim 28, wherein said step of forming a grooved -surface pattern is comprises embossing the grooved-surface pattern

CLAIM 30. The method according to claim 23, further comprising after said step (d), grinding the surface of resin-fiber matrix for obtaining desired surface characteristics.

CLAIM 31. The method according to claim 30, wherein said step of grinding comprises forming surface asperities in the surface of the resin-fiber matrix.

CLAIM 32. In a chemical mechanical polishing apparatus for the polishing of substrates, which apparatus comprises a rotating platen, a polishing pad, having a polishing surface, attached to said rotating platen, an upper rotating member for retaining a wafer carrier for a wafer substrate, slurry means for introducing slurry onto the polishing pad , the improvement comprising:

said polishing pad being of a porous structure and comprising a fibrous matrix consisting of porous fibers bound with a thermoset resin material; said polishing pad comprising voids in which said polishing slurry flows during chemical mechanical polishing of substrates and in which debris formed during the chemical mechanical polishing of substrates are stored.

CLAIM 33. The chemical mechanical polishing apparatus for the polishing of substrates according to claim 32, wherein said fibrous matrix consists of at least one of: cellulose fibers and "ARAMID", and said thermoset resin material consists of at least one of the following: Phenolic resin, epoxy, silicone, for binding said fibers.

CLAIM 34. The chemical mechanical polishing apparatus for the polishing of substrates according to claim 32, wherein said polishing surface comprises a ground surface in order that said fibrous matrix thereat is of open construction so that polishing slurry may be readily absorbed and optimally distributed during chemical mechanical polishing of substrates.

CLAIM 35. The chemical mechanical polishing apparatus for the polishing of substrates according to claim 32, wherein said fibers of said fibrous matrix are fortified with latex.

CLAIM 36. The chemical mechanical polishing apparatus for the polishing of substrates according to claim 34, wherein said ground polishing surface consists of surface asperities for optimizing the distribution of said polishing slurry during chemical mechanical polishing of substrates.

CLAIM 37. The chemical mechanical polishing apparatus for the polishing of substrates according to claim 36, wherein said surface asperities are at least 10 microns in depth, width and/or length.

CLAIM 38. The chemical mechanical polishing apparatus for the polishing of substrates according to claim 32, wherein said polishing surface comprises a groove-pattern having grooves for optimizing the distribution of said slurry during chemical mechanical polishing of substrates.

CLAIM 39. The chemical mechanical polishing apparatus for the polishing of substrates according to claim 38, wherein said groove-pattern comprises an arc-radial groove pattern.

CLAIM 40. The chemical mechanical polishing apparatus for the polishing of substrates according to claim 32, wherein said fibrous matrix is comprised of fibers having cross-sectional diameters of between 10 and 50 microns, and a length in the range of between .4 and 1.3mm.